

Features

- 100% Avalanche tested
- Revolutionary semiconductor material SiliconCarbide
- High blocking voltage with low on-resistance
- High-speed switching with very low switching losses
- High-speed and high robust intrinsic body diode
- Optimized package with separate driver source pin

Application

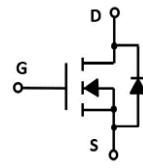
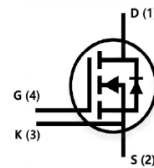
- Motor Drives
- EV battery chargers
- Solar energy system
- UPS
- Industrial motor control



Halogen-Free

Product Summary

V_{DS}	$R_{DS(ON)}$ TYP	I_D
1200V	40mΩ@18V	60A



Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Symbol	Parameter	Rating	Unit
Common Ratings (TC=25°C Unless Otherwise Noted)			
V_{DS}	Drain-Source Breakdown Voltage	1200	V
V_{GS}	Gate-Source Voltage	-10/+22	V
V_{GSop}	Recommended Operation Voltage of Gate to Source	-4/+18	V
T_J, T_{STG}	Storage Temperature Range	-55 to 175	°C
I_S	Diode Continuous Forward Current	Tc=25°C 60	A
I_{DM}	Pulse Drain Current Tested	Tc=25°C 135	A
		Tc=100°C 100	A
I_D	Continuous Drain Current	Tc=25°C 60	A
		Tc=100°C 50	A
P_D	Maximum Power Dissipation	Tc=25°C 283	W
$R_{th(j-c)}$	Thermal Resistance from Junction-Case	0.529	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MA40C12A	TO-247	MA40C12A	/	/	/	/

Electrical Characteristics (TJ=25℃ unless otherwise noted)						
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)						
BV _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =500μA	1200	1500	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =1200V, V _{GS} =0V	--	--	10	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =18V, V _{DS} =0V	--	--	100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =9mA	2.0	--	4.0	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =18V, I _D =40A	--	40	52	mΩ
		V _{GS} =18V, I _D =40A, Tj=175℃	--	62	--	mΩ
Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =800V, V _{GS} =0V, f=1MHz	--	1860	--	pF
C _{OSS}	Output Capacitance		--	75	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	7	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =800V, I _D =40A, V _{GS} =-4/18V	--	80	--	nC
Q _{gs}	Gate Source Charge		--	3	--	nC
Q _{gd}	Gate Drain Charge		--	13	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =800V, I _D =40A, V _{GS} =-4/18V, R _G =10Ω	--	13	--	nS
t _r	Turn-on Rise Time		--	30	--	nS
t _{d(off)}	Turn-Off Delay Time		--	35	--	nS
t _f	Turn-Off Fall Time		--	10	--	nS
R _g	Gate Resistance	V _{AC} =25mV, f=1MHz	--	2	--	Ω
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25℃, I _S =20A	--	4.5	--	V
I _S	Continuous Diode Forward Current	V _{GS} =-4V, Tj=25℃	--	68	--	A
t _{rr}	Reverse Recovery Time	V _{GS} = 4V, I _{SD} =40A, V _R =800V, di/dt=530A/us, Tj=25℃	--	28	--	ns
Q _{rr}	Reverse Recovery Charge		--	83	--	nC
I _{rrm}	Peak Reverse Recovery Current		--	5.3	--	A

Typical Operating Characteristics

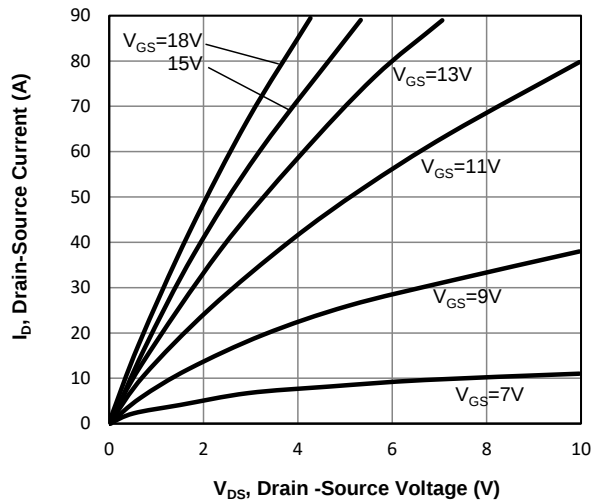


Fig1. Typical Output Characteristics

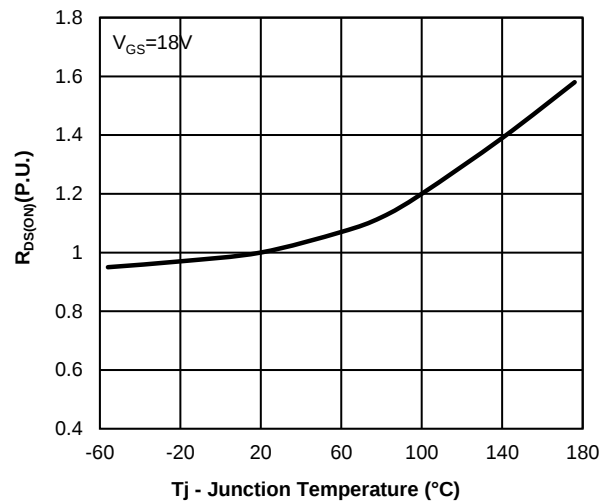


Fig2. Normalized On-Resistance Vs. Temperature

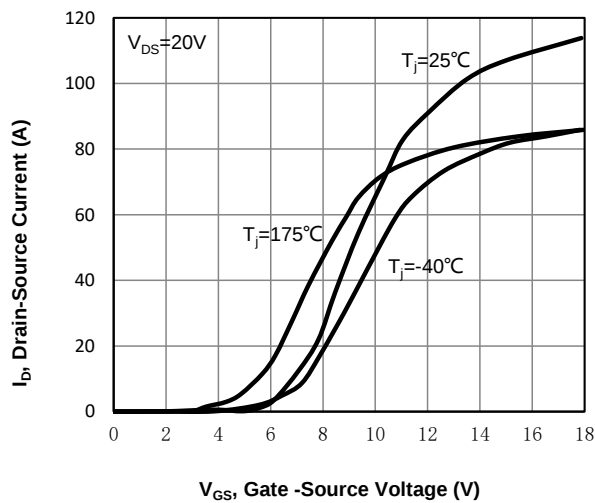


Fig3. Typical Transfer Characteristics

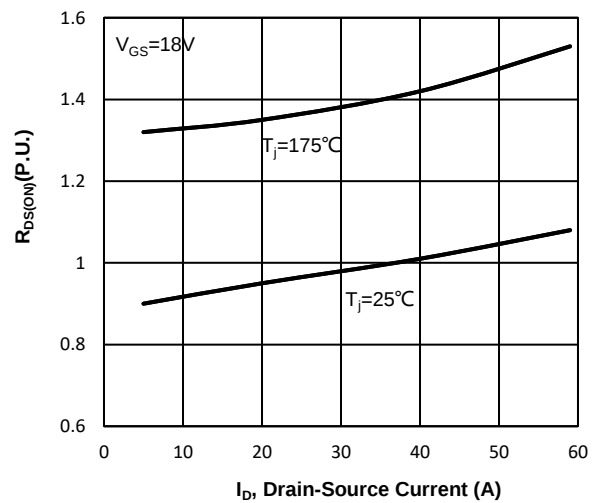


Fig4. On-Resistance Vs. Drain-Source Current

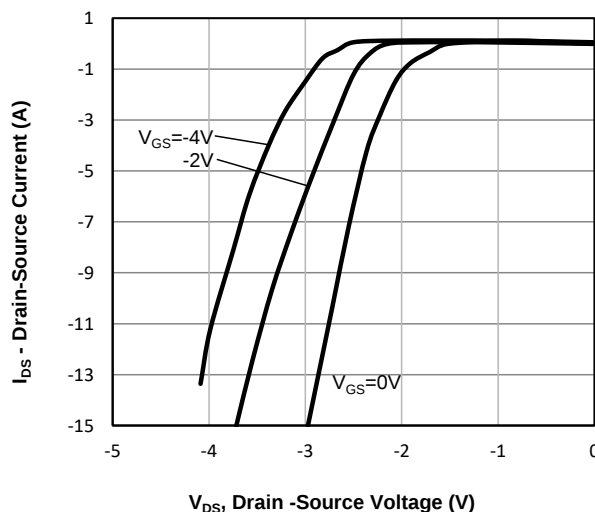


Fig5. Body Diode Characteristics

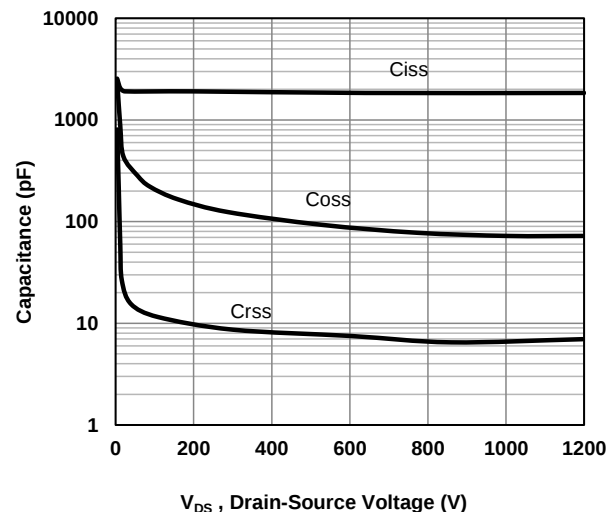
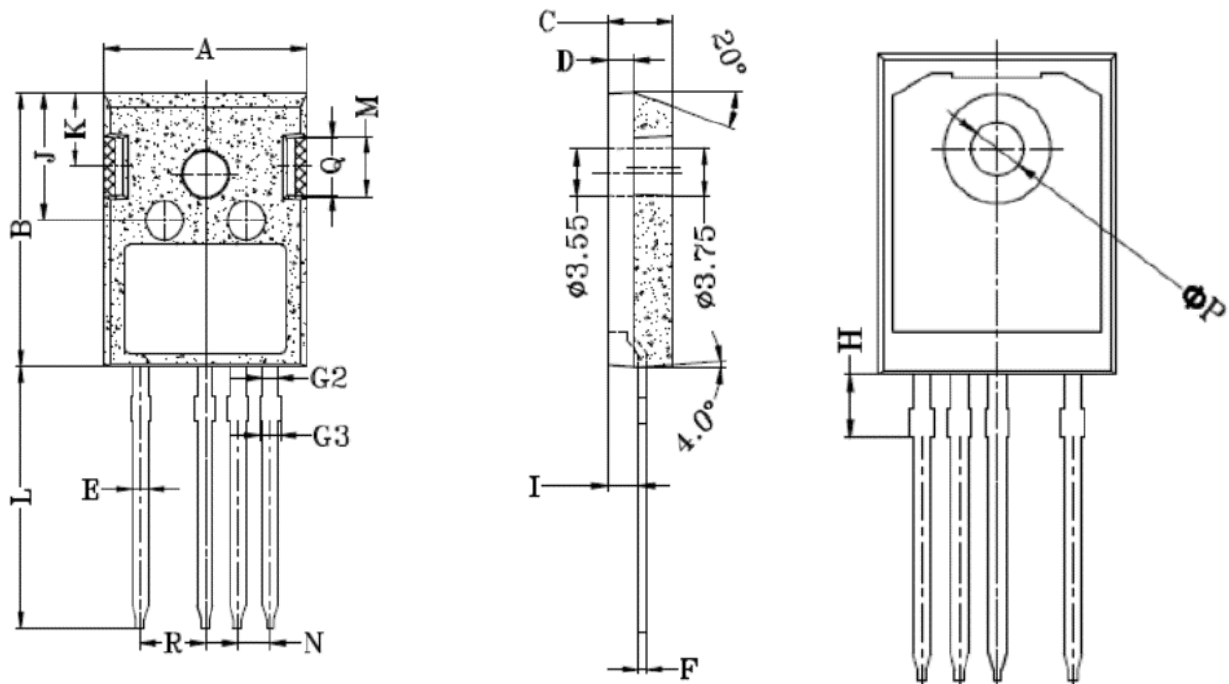


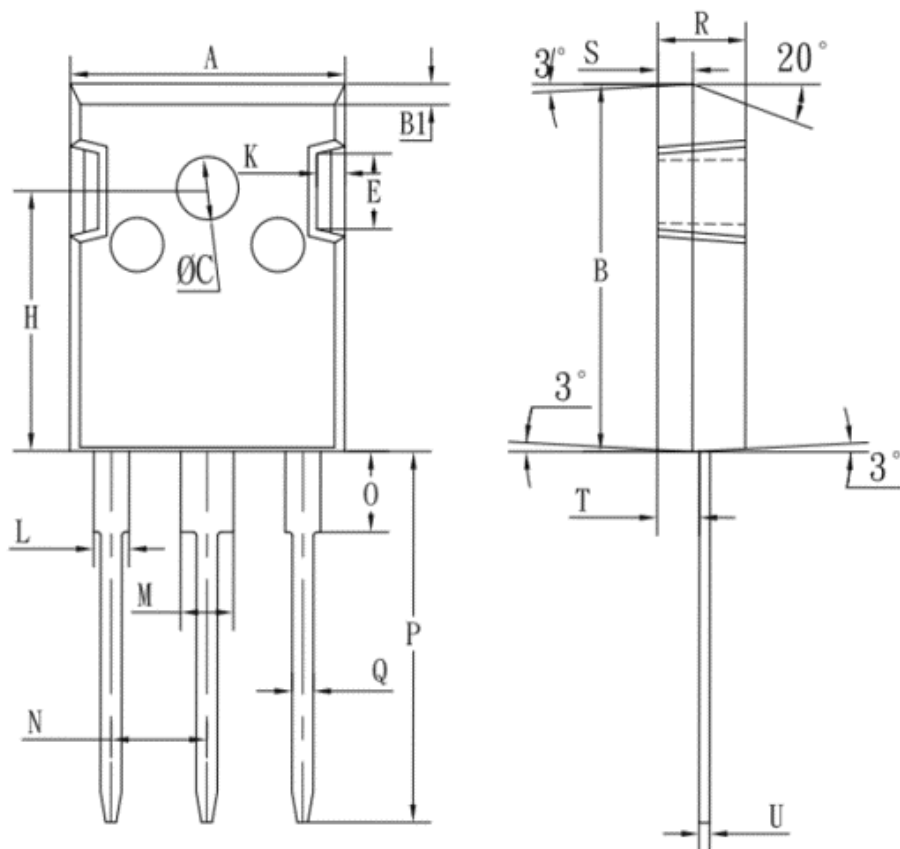
Fig6 Typical Capacitance Vs. Drain-Source

TO-247-4L Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	15.800	16.000	0.625	0.633
B	20.900	21.100	0.826	0.834
C	4.900	5.100	0.194	0.202
D	1.900	2.100	0.075	0.083
E	1.100	1.300	0.043	0.051
F	0.500	0.700	0.020	0.028
G2	1.100	1.300	0.043	0.051
G3	1.180	1.380	0.046	0.054
H	4.180	4.380	0.165	0.173
I	2.300	2.500	0.091	0.099
J	9.650	9.850	0.380	0.388
K	5.540	5.740	0.219	0.227
L	19.800	20.200	0.783	0.799
M	4.500	4.700	0.178	0.186
N	2.340	2.740	0.093	0.108
ΦP	3.400	3.600	0.134	0.142
Q	4.232	4.432	0.167	0.175
R	4.880	5.280	0.192	0.208

TO-247-3L Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	15.510	15.710	0.613	0.621
B	20.420	20.520	0.808	0.811
B1	0.890	1.120	0.035	0.044
C	3.620	4.590	0.143	0.182
E	4.500	5.050	0.178	0.200
H	14.220	14.560	0.562	0.576
K	1.500	1.680	0.059	0.066
L	2.050	2.150	0.081	0.085
M	2.950	3.100	0.117	0.123
N	5.410	5.460	0.214	0.216
O	4.250	4.400	0.167	0.173
P	20.510	20.760	0.811	0.821
Q	1.170	1.230	0.046	0.049
R	4.950	5.050	0.196	0.200
Symbol	1.980	2.040	0.078	0.081
T	2.350	2.410	0.093	0.095
U	0.600	0.660	0.024	0.026